Appendix
Correspondence between Dr. Peter Scholz, CDHS, and Dr. Eva Hnizdo, NIOSH

Email by Peter Scholz.

I work for the California Department of Health Services' Occupational Health Branch as an industrial hygienist. I have been recently asked by Cal-EPA's Office of Environmental Health Hazard Assessment to assist in responding to comments received on their draft Chronic Toxicity Summary for Silica (Crystalline, Respirable). I wonder if you would mind if I put two questions to you as the primary author of the paper (Hnizdo and Sluis-Cremer, 1993)that this document most directly relies on?

The article by G.W. Gibbs and R.S. J Du Toit Estimating the Quartz Exposure of South African Gold Miners, Ann. Occup. Hyg. Vol. 46, 2002, asserts that the percentage of crystalline quartz in the respirable (acid washed) dust concentrations published in your Table II was not 30% but rather more likely 54%. The article states that 30% crystalline quartz content applied to the pre-acid washed respirable dust but not the post-acid washed respirable dust. Do you, in retrospect, agree with this assessment?

The article also quotes a more recent analysis of quartz content of S.A. mining rock (Kielblock et al., 1997) that gives the overall content as being closer to 15%. This would mean that the 30% for the acid washed dust was perhaps correct after all! Do you, in retrospect, have any reason to believe that this 15% (of the pre-washed respirable dust mass) would have been the more appropriate value to use for your purposes?

Reply by Eva Hnizdo

Your Question:
The article by G.W. Gibbs and R.S. J Du Toit Estimating the Quartz Exposure of South African Gold Miners, Ann. Occup. Hyg. Vol. 46, 2002, asserts that the percentage of crystalline quartz in the respirable (acid washed) dust concentrations published in your Table II was not 30% but rather more likely 54%. The article states that 30% crystalline quartz content applied to the pre-acid washed respirable dust but not the post-acid washed respirable dust. Do you, in retrospect, agree with this assessment?

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Answer:
I admit that I am not sure now what is correct.

However, I tend to think that the historical and current gravimetric measurements that are available should provide guidance on the conversion factor. Past surveys indicate that the amount of airborne respirable dust in SA gold mines in 1980's and in 1970's was on average around 0.4 mg/m^3 with average quartz concentration of 0.08 mg/m^3 (about 20%). REG Rendall in his PH.D. thesis published results from Chamber of Mines gravimetric surveys:

1) survey done in 1987/88:
   mean respirable dusts (mg/m^3) ranged from 0.48 to 0.30
   mean quartz (mg/m3) ranged from 0.14 to 0.03.

2) survey done in 1977:
   mean respirable dust (n=166) was 0.4 mg/m^3 (0.68-0.29)
   mean respirable quartz 0.08 mg/m^3 (0.02-0.13)

3) done in 1956-1972: by gravimetric sampling of total dust, conversion made by Sichel's formula into
   respirable dust which then ranged from 0.47 to 0.20 (mean 0.40 mg/m^3)
   respirable quartz which ranged from 0.02 to 0.18. (mean 0.09 mg/m^3)
I have his thesis and the tables which provide more detailed averages by occupational categories and sample sizes.

I have also seen summary data from 1990s dust surveillance program in the SA gold mines. I remember that the average amount of respirable dust was around 0.40 mg/m3 and the amount of average quartz in respirable dust was below 20%. So would trust the actual reported gravimetric data rather than the conversions into gravimetric quartz.

However, what confuses me is that Beadle in 1971 reported that 31% of total dust was quartz, ranging from 14-62%, this was before acid treatment. He also reported % after acid loss and, % of quartz which ranged from 7-42% from electrostatic precipitator. He also reported % quartz in residue which was on average 54%. I am not sure if this was after acid treatment residue that should be considered. I think that this figure is what Mr Gibbs feels reflects the 54%. I have this reference and table in case you would like me to fax it to you. This reference confuses me.

It is very difficult to get any information from SA on current data, to sort out this issue. Since the exposure levels did not changed that much since 1950s even current data could provide useful information.

I am not sure if I am of help. If you need additional information I have most of the Beadle's references.